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June 1942

THE FLAG IS ON THE PLOW

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

Food and feed are on the make. The bounty to fill the ships is on the assembly lines of the American farm. Agriculture is at war not only against the Axis but against insects, weeds, drought, disease, and soil waste. *Crop Husbandry in This Year of War*, leading article in this issue, is timely and pertinent reading.

UNITED STATES DEPARTMENT OF AGRICULTURE – WASHINGTON

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WELLINGTON BRINK
EDITOR

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SOIL CONSERVATION

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CROP HUSBANDRY IN THIS YEAR OF WAR

By C. R. ENLOW [1]

EVERYONE is aware of the effort that is being expended to increase rather sharply the production of crops and livestock. Corn goals are set at 10 percent over 1941, soybeans 54 percent, flax 34 percent, and sugar crops to the limit of processing facilities. The production of many other field crops, vegetables, and fruits will be increased. Hog marketings in 1942 are estimated at 20 percent higher than in 1941; in fact, all livestock and livestock products are being pushed.

All agricultural agencies are working together to assist farmers in planning for this necessary expansion of the farm business throughout the country. Extraordinary efforts have been put forth to see that the increased acreage is in those areas where high production can be expected with minimum disturbance to the general farming program, and with the least damage to the soil. However, with such an increase in crop acreage to be planned and initiated within a few months, all of us must realize that many complications will arise. There is a shortage of farm labor and farming machinery. There is less opportunity to control soil erosion and fight the usual crop enemies, insects, and disease. Control of weeds, so important at all times, is particularly important during this cropping season. It is unfortunate that farmers must face this increased production program with its many problems when they are handicapped through lack of labor and inability to obtain much needed equipment; but it is a challenge that will be met by all farmers who realize that their crops are essential to win the war.

It has been pointed out by an agricultural authority that the danger of plant disease epidemics and insect infestation is acute at this time because of the increased crop acreage on the farm. Farmers will have less time to combat crop enemies because of the heavy work load and shortage of farm labor. As this is written, early in April, the green bug is reported to have wiped out 60 percent of the oat crop in north Texas, and warnings have been sent out in Oklahoma and Kansas so that farmers will be prepared to plant catch crops if the green bug destroys oats, barley, wheat, and forage crops. There is no practical control measure for the green bug in large infestations of this kind.

After a crop has been planted, the yield depends to a large extent on the efforts put forth by the farmer to keep it in good growing condition. Tillage is of particular importance from the standpoint of weed control. Weeds are heavy users of moisture and plant food and if allowed to grow, they will take a large share of the plant food and water that should go to the growing crop. Timely and proper tillage means a great deal in obtaining excellent yields of row crops. It was proved years ago that the main purpose of tillage is weed control, and there is no reason for producing a dust mulch or for stirring the soil to a considerable depth. Faced with the necessity of conserving fuel and labor, this is quite important to the farmer.

Where available, tillage implements that operate just beneath the surface of the ground, leaving the weeds and other residues on the surface, should be used, as they help conserve both moisture and soil. It has been proved by experiment that a much higher percentage of the rainfall goes into the soil for crop use if a light covering of vegetative material is on the soil. Further, it has been proved that crop yields are materially increased by such methods, particularly if the rainfall happens to be somewhat deficient during the growing season. If the planting was made on the contour, still higher yields can be expected as more moisture is conserved by this practice.

[1] Chief, agronomy division, Soil Conservation Service, Washington, D. C.

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While discussing weed control, I should like to point out that in areas where clovers and grasses are planted with grain, it is worth while to mow the stubble fields when there is considerable weed infestation. Such weeds as pigeon grass, ragweed, cocklebur, and smartweeds should be mowed in July, or whenever they overtop the stubble. They should be mowed high so as not to cut off the small clover and grass plants. In most cases, it will be necessary to mow again, probably in August, to prevent the weeds from seeding. This time the mower can be lowered to a height of 2 or 3 inches. Such operation will be of tremendous value in the clover and grass crop the following year. With limited supplies of fertilizer in sight, the importance of abundant supplies of legume and grass seeds cannot be overemphasized. They will be needed as cover crops to keep up yields of staple crops and also for pasture and forage production.

Peanut growers will be extremely interested in the results of experiments in Virginia, North Carolina, and Georgia in increasing yields of peanuts by dusting with sulphur to control leaf spot disease. Four years' results from sulphur dusting of peanuts at the Virginia Experiment Station show an increase of from 20 to 50 percent in the yield of nuts, and sometimes the yield of hay has been doubled. In 20 demonstrations in 1940 the cost for the dust was $2.52 an acre, but the treatment increased the value of the crop by $11.75 per acre.

At the North Carolina Experiment Station, copper-sulphur dusting produced increases averaging about 500 pounds of peanuts and 800 pounds of hay per acre. The cost of materials and labor was $5 an acre, and the value of the increased yields of peanuts was $15 per acre. More than 100 demonstrations with sulphur dust, carried out by the Extension Service in North Carolina from 1937 to 1940, showed an increased per acre yield of 261 pounds of nuts and 562 pounds of hay.

The Georgia Experiment Station reports similar results from sulphur dusting in seven Georgia Counties from 1937 to 1940, inclusive. The dusting increased the yield of peanuts 329 pounds per acre. Certainly these results justify serious consideration by peanut growers. State experiment station authorities and the Extension Service have full information and are in position to help materially in meeting the production goals for peanuts.

A new and more economical development in the control of noxious weeds is crop production combined with weed control. It has been learned, for example, that bindweed on wheatland can be practically eradicated in 3 years, without interrupting wheat production. This system is as follows:

First year.—Fallow the land the first summer from May to September preferably with sub-surface tillage implements, each 2 weeks. Seed wheat at the normal time in the fall.

Second year.—After harvest, start subsurface tillage operations at once, continuing each 2 weeks until wheat-seeding time.

Third year.—After harvest, proceed as in the second year. It has been determined that the wheat will keep the bindweed under control, while the tillage operation reduces the infestation when the crop is not on the land.

Not much can be done to control diseases of forage and cereal crops during the growing season. It is important, however, that farmers contact their county agents or the State experiment stations immediately upon finding diseases in their fields, as it is possible

The value of a cover crop is well illustrated in this picture. The corn on the left is following lespedeza, that on the right is following cotton and corn. The yields were 28 and 7 bushels per acre respectively. Cover or green manure crops are of special importance during the present period when fertilizer is scarce.

On this sandy soil strips of sorghum or other tall-growing crops are essential to enable a farmer to produce peanuts. Wind erosion is a hazard without such protection. Contouring increases yields by conserving moisture.

that measures can be recommended either for immediate benefit or to prevent repetition the following year. In some sections of the country, disease-resistant strains of oats, barley, wheat, and sorghums have been developed and it is extremely important that the farmers make definite plans for saving seed of the resistant varieties and strains. While this has no material effect on production for this season, it is extremely important for next year.

As far as crop insects are concerned, general control measures for such insects as boll weevil, chinchbug, grasshoppers, and Hessian fly have been followed for years and are known by most farmers. The State experiment stations and the Bureau of Entomology and Plant Quarantine are continuing to improve and develop measures for the control of such insects as the Japanese beetle, Mormon cricket, and the European corn borer. Farmers should keep close watch for insects, and immediately ask the county agent or the State experiment station for information when it appears that infestations are beginning.

The Bureau of Entomology and Plant Quarantine has issued a summary of the insect situation as of the end of 1941. It appears the boll weevil was present in more than normal abundance throughout the summer of 1941 and, in view of the very mild winter, may present a stronger than usual attack this summer. The chinchbug was considerably reduced in numbers last year by the spring and summer rains during critical development periods of this pest. The Japanese beetle hibernated with a low food reserve due to the dry weather, although there was a large increase in the total acreage of infestation. The dry weather of last summer in the areas infested by European corn borer may have a deleterious effect on this insect. Grasshopper surveys indicate that threatening-to-severe infestations may occur in local areas during the summer of 1942 in several of the midwestern States. There has been a general increase in the Hessian fly infestation throughout the major winter wheat belt. At present there are no indications of generally severe infestations for any of the principal crop insects, although of course we must understand that unforeseen weather conditions may change the picture within a relatively short time.

In studying and discussing insect pests, many of our entomologists have followed rather closely the developments in soil conservation practices. This is a natural and consistent trend, as any material change in cropping practices is bound to affect the insect situation. For example, there has been much discussion over the effect of strip cropping on the grasshopper situation—it was feared that the new field arrangement might make poisoning of the hoppers an impossible task. Such a situation has not as yet developed; instead it appears that it will be possible to develop control measures through the sequence and arrange-

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THE FLAG IS ON THE PLOW

By W. C. LOWDERMILK

ASSISTANT CHIEF, SOIL CONSERVATION SERVICE

IN the last reckoning all things are purchased with food. Such is the fateful and awful truth that hideous famines make known. World-wide war that today is strangling civilization further shows up the enormity of this fact. Food is necessary for victory. Food is rationed by aggressors to subjugate rebellious peoples of occupied countries. Peoples will sell their liberty, their all, for food when driven to extremes of this tragic choice. There is no substitute for food.

Seeing how much people will give up for food, let us look at the things food will buy; for money is only a symbol—a convenience in exchanges of goods we need and want. Our civilization is bought with food; our cultural advantages and satisfactions, our industrial achievements as a nation, and now our all-out war effort against treacherous and powerful enemies—all these are purchased with food.

Not until tillers of soil have grown surplus food beyond their own needs are their fellows released to take up other tasks than those of growing food—tasks of a complex division of labor that give rise to high standards of living and great national effort. This principle holds true regardless of the motive that may prompt tillers of soil to grow food beyond their own needs, whether urged on by whip-lashes of slave drivers, as in ancient Egypt, or by allurements of the profit motive in our heydays of peace, or by compulsions of war in our present crisis.

Lumberjacks do not log forest stands of timber unless food is made available. Miners do not dig the ore out of the bowels of majestic mountains—nor do skilled mechanics make powerful munitions of war. Brave soldiers do not fight our battles of freedom unless food is grown in abundance for their daily needs by our tillers of soil. Food, abundant and adequate, is necessary to victory. The flag is on the plow as well as on the battleship and on the tank.

Moreover, food comes from the land, our Mother Earth. The land, with its waters, affords us nourishment. Our wartime goal is maximum production from the land—our land, the silent partner of tillers of soil in this exacting and vital task. In this production the land must not be damaged and wasted in unwise and careless use—it must be safeguarded from all leanness. By saving the blessings of Heaven in the rain, holding plant foods within the soil, and conserving the soil itself we can keep and increase the productive powers of the land.

The land yields its increase to the husbandman who watches over and cares for it with understanding and skill. The earth rewards richly the knowing and diligent. This partnership of land and farmer is the rock foundation of our complex social structure and of our all-out war effort. It justifies our dream of a future after the devastating storm of war has passed, when we shall see in luminous clouds a rainbow over the sorrowing earth drenched with the blood of millions of men and women and children.

Withal, defense of the land and its productive power, as the source of our food, is the foundation of the defense of our country and our way of life against treacherous attacks of foreign aggressors who would work us woe. There is no substitute for food, for good land, or for the land we love.

WAR PRODUCTION AND THE TECHNICIAN

By WILLIAM T. ANGLE [1]

EVERY soil conservation technician is right on the firing line. He can do his utmost for victory by tackling his regular work with his whole heart and soul.

Suppose, for instance, that a technician helps farmers lay out 1,000 acres of corn ground for contour cultivation, and that the yield is increased by 5 bushels an acre. That means the production of an additional 5,000 bushels of corn. Converted into terms of live pork, this represents a 44,000-pound increase in the live pork supply.

This example is conservative. The experiences of farmers and observations of agricultural workers indicate that yields were increased from 15 to 25 percent by contour cultivation on the sloping lands of the Northern Great Plains where row crops are grown and water runoff otherwise is appreciable.

Helping farmers put 1,000 acres of corn on the contour would take only part of a technician's time. He still could help put small grain on the contour, help establish grassed waterways, help get low-yielding croplands seeded to legumes and grasses—all measures that will boost the food supply. Worthwhile increases in close-growing crops, such as oats, barley, and wheat, have been obtained from contouring.

Or, the technician may be located in a part of the Northern Great Plains where rapid establishment of crested wheatgrass or other grasses on idle land is the big thing in upping food production. When he assists the farmers and rangemen in the dry land areas of this northern region in establishing crested wheatgrass on 15,000 acres of idle land he is instrumental in making it possible for them to carry another 500 to 1,000 animal units. If 15 acres of crested wheatgrass, used appropriately on a seasonal basis, is equivalent to a year-long requirement for a cow, the increase amounts to 1,000 cows. If it takes 30 acres per cow, the increase is 500 cows. An 80-percent calf crop, then, means that the establishment of grass on 15,000 acres brings an increase of 400 to 800 calves for market.

But one may prefer to think in terms of sheep. The same land can furnish range for 2,000 to 4,000 additional ewes producing about the same number of lambs annually. In addition, the increase in wool production totals 15,000 to 30,000 pounds a year.

This in itself certainly is no small contribution to the Nation's war effort—and it constitutes but one result of a technician's varied work.

How about those areas where inadequate water supply is the element that prevents full utilization of grass and other resources by farmers and ranchers? How much can the technician help increase food production by assisting in the development of springs, the construction of water-impounding dams and dugouts, the sinking of wells, the improvement of irrigation systems, the development of water-spreading facilities?

Take stock of all these things. They count up—you will find that you are in the war, and no doubt about it. Your part in increasing food production can exceed the individual output of any other single person in your community.

Ability to see clearly the job to be done is the big thing now—always of course, but especially now. The technician's job these days is to help farmers grow more of the foods most needed in the job of winning the war. Conservation practices are needed to get this done as well as to conserve resources. The farm planner, for example, can well afford to devote some time to helping district supervisors and county war boards as they concentrate on those conservation practices that will boost the output of needed foods in the shortest time possible. He should arrange priorities in the application of conservation practices in harmony with this aim. In normal times, 6, 8, 10, or more conservation measures may be necessary to bring about the conversions—in land use, farm developments and farm organization—for total application of conservation practices on a typical farm or ranch. But this is war-time production, and those conservation practices that will help the farmers to attain maximum output of food products must come first.

The farmers want it that way, and this is in full accord with Soil Conservation Service policy, a policy that works with the farmer to develop and apply conservation practices, in the order that is most desirable from all viewpoints.

Furthermore, every technician undoubtedly will have many opportunities to help war boards and district supervisors in their efforts to attain maximum

(*Continued on p. 303*)

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GROWING SOYBEANS WITH MINIMUM EROSION

By DWIGHT D. SMITH [1]

RECENT research studies indicate that soybeans have a fair chance of losing at least a part of their reputation for being one of the worst crops for soil destruction through erosion. These research studies show that by providing a desirable soil condition preceding the beans, planting to secure maximum canopy protection to the soil, drilling for a fall and winter cover crop immediately following harvest, and reducing the slope hazard by use of supporting conservation practices, the soil losses will be reduced to a minimum amount well within the limits for conservation of soil resources.

Soil and water conservation studies as pertaining to soybeans have been carried out at both the Bethany and McCredie Soil Conservation Experiment Stations in Missouri. The Bethany studies were begun in 1931 on Shelby loam soil of 8 to 9 percent slope, and those on the McCredie station in 1939 on Putnam silt loam of about 3 percent slope.

Conditioning of the soil reduces losses.—The soil loss from the soybeans, winter barley, and meadow rotation at McCredie during 1941 was 2.5 tons per acre, as compared with 7.5 tons from the soybean and winter barley annual rotation, and 12.2 tons from the corn, soybeans, wheat and lespedeza, lespedeza rotation. Runoff from the three rotations in the order given was 16.4, 17.6, and 20.6 inches. Losses from the corn, oats, meadow rotation were about the same as from the annual rotation of soybeans and winter barley. Erosion and runoff during 1941 were high due to the excessive rainfall in April, July, and October. The soybeans were drilled solid, lengthwise of the plots. All crops of the rotations were grown on individual plots.

In planning the McCredie rotation studies, soybeans were recognized as a crop of economic importance for the claypan soils. The rotations were designed after a study of the soil and water losses from the Bethany rotations (*1*) by monthly periods, as shown in the chart. These studies indicated the critical periods for soybeans, their unfavorable position when following corn, and that losses from soybeans could be appreciably reduced by combining them with excellent erosion-resisting crops.

[1] Project supervisor, Missouri Agricultural Experiment Station and Soil Conservation Experiment Stations, Bethany and McCredie, Mo. cooperating.

In the soybean, winter barley, meadow rotation, a maximum of vegetative protection is provided. Immediately after the soybean harvest in late August, winter barley is seeded. This early seeded crop develops in time to give protection to the soil from the late fall and winter rains. Meadow seeded in the barley provides protection after the barley is harvested, throughout the next year, and into the spring of the second year following seeding, until plowing for soybeans. The conditioning of the soil, by the organic matter additions and the soil binding qualities of the meadow roots, carries over into the soybean cropping period to reduce runoff and soil loss from the soybeans, just as does the sod that precedes a corn crop. (*2*)

The accompanying table shows the soil and water losses by periods for the soybean years of the three McCredie rotations. The total calendar-year soil loss for soybeans following meadow was 5.3 tons per acre, as compared to 7.5 tons when following winter barley, and 23.9 tons when following corn. For a 4.61-inch rain the middle of April, the soil loss from the meadow preceding the soybeans was less than 1 ton per acre, while that from the cornstalk plot was 13.3 tons. During the rains of July, a similar relationship existed, although not so extreme. In the fall, soil losses from the three plots were relatively low considering the amount of rainfall. The two plots in winter barley, however, had appreciably less run-off than the one with the soybean stubble.

Maximum canopy protection reduces losses.—At the Bethany station, both the soil and water losses for the period, April 1 to September 30, from soybeans drilled solid and grown in a corn, soybean, wheat, meadow rotation, have averaged 37 percent less than when the beans were planted in 42-inch cultivated rows and grown in a corn, soybean, oats, meadow rotation. The soil loss for the 6 months' period, October 1 to March 31, from the plot of the latter rotation, which was without a cover crop until after drilling of oats the next spring, averaged 4.5 times greater than that from the other rotation plot which was drilled to wheat the last week in September.

An example of the canopy protection provided by soybeans, drilled solid when at their maximum growth stage, was provided by the 50-year frequency rain of August 13, 1940, at the McCredie station. The

Table showing soil and water losses, by periods, from the soybean crops of the McCredie station rotations, 1941

Rotation	Cover *	Period *	Rainfall	Runoff	Soil loss per acre
			Inches	*Percent*	*Tons*
Four-year: Corn-soybeans-wheat and lespedeza-lespedeza.	Corn stubble	Jan. 1 to May 20	11.8	33	13.4
	Soybeans	May 21 to Aug. 24	12.8	36	8.6
	Soybean stubble	Aug. 25 to Oct. 6	18.2	51	1.4
	....do	Oct. 7 to Dec. 31	11.4	47	.4
Total			54.2	42	23.8
Annual: Soybeans-winter barley	Barley	Jan. 1 to May 20	11.8	19	3.6
	Soybeans	May 21 to Aug. 24	12.8	33	1.8
	Barley	Aug. 25 to Oct. 6	18.2	36	1.5
	....do	Oct. 7 to Dec. 31	11.4	41	.6
Total			54.2	33	7.5
Three-year: Soybeans-winter barley-meadow	Meadow stubble	Jan. 1 to May 20	11.8	31	.9
	Soybeans	May 21 to Aug. 24	12.8	29	3.4
	Barley	Aug. 25 to Oct. 6	18.2	33	.9
	....do	Oct. 7 to Dec. 31	11.4	31	.1
Total			54.2	31	5.3

* Soybeans drilled on May 20, harvested Aug. 21, and barley drilled Aug. 25; Oct. 6 was the date wheat should have been seeded in the 4-year rotation, but rain-saturated soil prevented drilling on this or a later date in 1941. Barley on the annual rotation plots was grazed by cattle Apr. 23 to May 20 and Sept. 24 to Oct. 22.

soybeans were over knee-high at the time of the rain and provided a complete canopy cover for the soil. During 30 minutes of the storm, 2.25 inches of rain fell. Runoff from the plots was less than from any of the other plots, and practically free of silt.

Losses are not excessive on terraced land.—Data are available from the rotation of corn, soybeans, wheat, meadow on terraced Shelby loam soil of about 9-percent slope at the Bethany station, for the 10-year period 1932 to 1941. Each crop of the rotation was grown each year on an individual inter-terrace area. The soybeans were drilled solid and all operations were on the contour.

Soil loss from the rotation, as measured at the ends of the terraces, averaged only 2.12 tons per acre per year, or a rate equivalent to removal of the surface 7 inches in about 500 years. This rate of loss was less than from other station studies upon which the fertility level was being maintained. (3) (4) The soil loss from the rotation, however, was the greatest for any rotation on terraced land, and there was appreciable movement of soil to the terrace channel. As these terraces have required very little maintenance during the last 8 years, it is thought that this movement of soil to the channel is largely accounted for by the method of up-hill plowing which is followed. (1)

Soil and water losses by months are shown in the accompanying chart for the 48 months of the 4-year rotation on the terraced land. Corn and meadow (clover-timothy) both occupied the land for 17-month periods during the rotation cycle. Soybeans occupied the land 6 months, and wheat the remaining 8 months. The soil loss occurring during the period for corn was 44 percent of the total rotation soil loss, whereas that from soybeans was 34 percent, from wheat 9 percent, and from meadow 13 percent.

The weaknesses of the rotation from an erosion control standpoint are that corn is not followed in the fall by a cover crop, the soybeans follow the corn, and wheat following the soybeans is not seeded sufficiently early in the fall to provide protection to the soil from late fall and winter rains. Elimination of corn from the rotation and seeding of rye immediately following soybean harvest, in place of the later seeding of wheat, would have reduced the rotation soil loss to less than one-half ton per acre per year, on the basis of the 1941 McCredie results.

Projection of Data

Soybeans may be grown in a rotation with fall-seeded small grain and meadow crops, with materially less erosion than from the same type rotation but with corn instead of soybeans, if the soybeans are drilled, and about equal losses if the soybeans are in 42-inch rows.

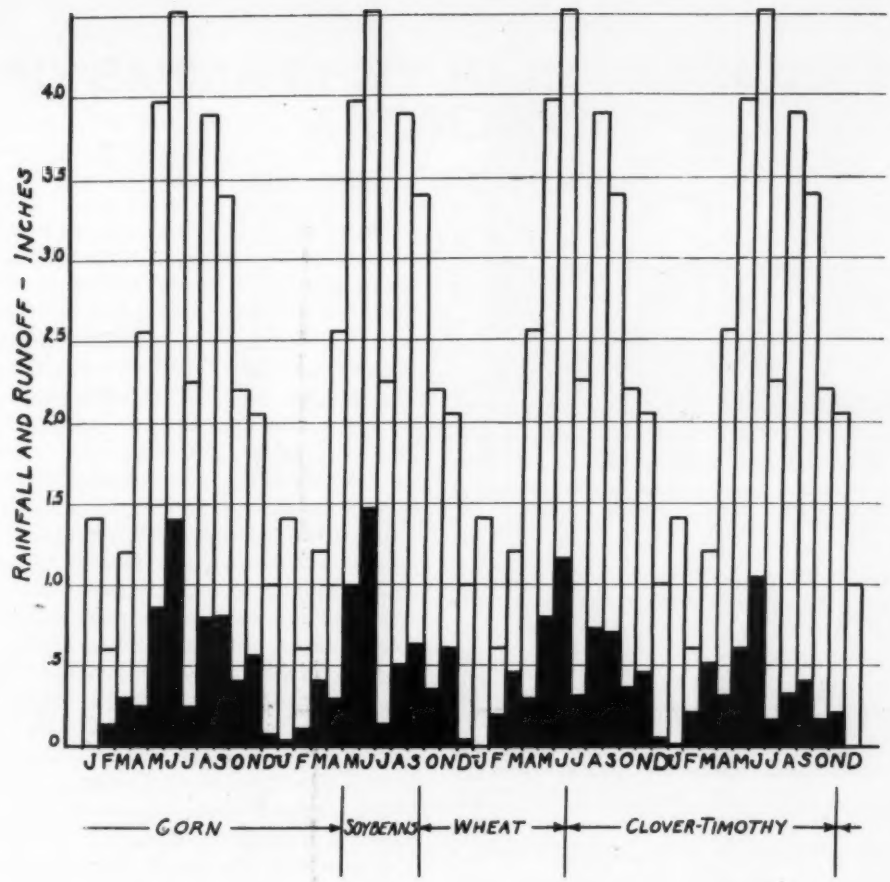
The erosion hazard from soybeans drilled solid in an annual rotation with winter barley appears to be no greater than with the rotation of corn, oats, meadow.

The rotation of corn, soybeans, wheat, meadow has several critical erosion periods, which preclude its use without supporting practices on sloping land subject to erosion. Even with the support of terraces

(*Continued on p. 300*)

THE CHART—Page 297

Ten-year average rainfall, runoff, and soil loss from a rotation of corn, soybeans, wheat, clover, timothy on terraced land. Soil Conservation Experiment Station, Bethany, Mo.


RAINFALL AND RUNOFF - INCHES
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J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
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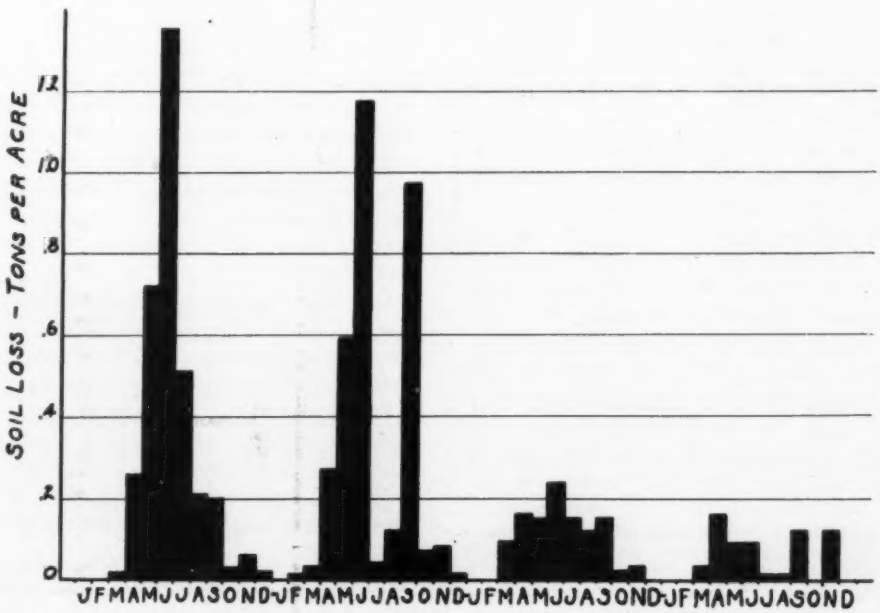
SOIL LOSS - TONS PER ACRE
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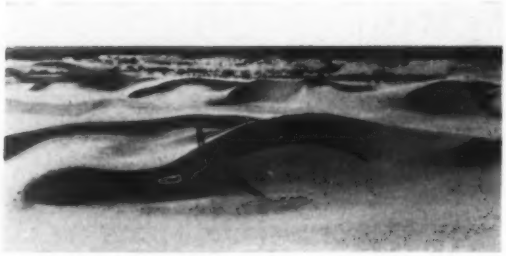
WIND EROSION IN THE PAMPAS OF ARGENTINA

By MANFREDO A. L. REICHART



The result of wind erosion—formation of dunes and moving sands which cover an area of 300 hectares to the west of Mackenna, Province of Córdoba.

THE Republic of Argentina has not been spared suffering in its own flesh the disastrous effects of soil erosion caused by wind and by water.

We have not profited by the grievously costly examples long displayed to us by countries like Canada, the United States, South Africa, Australia, etc. Through erosion these countries have ruined extensive areas of fertile fields, whose productivity can be restored only at great expense of money, sacrifice, and time.

In our country we have typical examples of water erosion in the subtropical region of the northeast, particularly in Missiones. There are also some examples, but of minor importance, in the central eastern part of the country (the Littoral), in southern Entre Rios, in Santa Fé, in Córdoba, and south of Buenos Aires.

But the effects of water erosion are slight in comparison with the destruction that wind erosion has inflicted upon the agricultural land of Argentina.

The zone most seriously affected by aeolian erosion lies in the west-central part of the country, especially in the area lying between 30° and 40° south latitude and between 61° and 66° west longitude.

The phenomenon has been of major importance in the southern parts of the Provinces of Córdoba, San Luis, and Buenos Aires, and particularly in the Territory of La Pampa—becoming especially severe in the east-central, west-central, and southwestern parts of the area mentioned.

EDITOR'S NOTE.—SOIL CONSERVATION acknowledges with appreciation the services of Miss Lois Olson in supplying the English translation of this article. The author is Chief, Soil Section, School of Agriculture and Veterinary Science, University of Buenos Aires.

This semiarid zone in the center of the country is characterized by a moderately warm climate, with temperatures high in summer and low in winter, and with scant rainfall that varies from 400 to 600 mm. per year and is distributed over 50 to 80 days.

According to Arena,[1] "it is a contact zone between two huge and rapidly moving air masses of different temperatures and densities; that from the north being hot and humid and the other from the southwest being dry and cold," the latter being the chief agent of wind erosion.

From an ecological standpoint, a portion of the region partakes of the characteristics of the savanna-grassland association but much the larger part consists of steppe vegetation characteristic of the plains, which comprise much of the pampa region.

The soil of the region is to a large extent loess, aptly termed "pampa loess." It consists of very fine particles, of a color varying from yellowish to greyish chestnut, reddish below and in places also grey verging upon green. It is of volcanic origin and has been transported by wind and water from the high mountain ranges of the west.

A noteworthy feature of the pampa soil, locally called "tosca," is the binding together by lime introduced by the infiltration of surface and subterranean waters. In part this appears in the form of nodules, rounded or branched, but also in solid compact layers of considerable thickness. In the highest part of the plain in southwestern La Pampa there is a true terrace of compact "tosca" that extends from the mountain ridges of Buenos Aires to the Territory of La Pampa. Above this loesslike, sandy formation, there is a thin capping of true soil that merges gradually into the parent material.

Obviously this must be considered a region of very sandy, porous soils, exceptionally poor in adhesive clay-humus colloids and, because of this, structurally deficient and unstable, and easily dispersed.

For these reasons, the soils of the region as a whole have a low capacity for retaining moisture and are extremely susceptible to blowing. The arboreal vegetation consists of clumps of associated species of islets, interspersed throughout the plains, with their

[1] Arena, Antonio. *La Conservación de la Fertilidad del Suelo.* 30 pp., illus. Buenos Aires, 1940. (Reprinted from *Conferencias* 5: 183–199, 1940.)

coarse vegetation. The islets consist of calden (*Prosopis caldenia*) associated with black algarroba (*Prosopis nigra*), chañar (*Gourlaea decorticans*), molle (*Schinus polygamus*), alpataco (*Prosopis alpataco*), jarilla (*Larrea divaricata*), etc.

By contrast, Graminaceae predominate in the herbaceous steppe vegetation of the plain, which is known as the erosion zone. Among the herbaceous plants are the coarse herbage, or "pastos duros," consisting of various species of Stipa of xerophytic character, and other sand-loving species.

Up to the present, the protective action of this mantle of vegetation has prevented the devastation of the soil on a large scale by the action of the wind. But natural factors, in conjunction with human, have destroyed this natural equilibrium and the fertile soil over a large area, noted until recently for its great productivity, has been blown away.

Few words suffice to explain the causes that precipitated wind erosion in a region of such great productivity.

In relatively recent years, various parts of the zone have been brought into cultivation, thereby increasing considerably the profits of agriculture. For the sake of agriculture, trees have been cleared over extensive areas and, in other places, the steppe cover has been destroyed by the plow.

Deprived of the vegetation that held it together, giving cohesion to the entire mobile mass, the sandy soil became particularly susceptible to blowing as soon as it dried out. The prolonged drought of the last 10 years, 1930–40, accompanied by strong winds from the southwest that swept over the great plain without orographical features, have been the immediate causes of soil erosion.

During the past year, the city of Bahía Blanca has suffered a torment of blowing soil, so intense that it has obscured the full light of day.

The lowering of the water table, caused by the reduction of the reserves of soil moisture by crops and herds, combined with other man-made technological factors such as inadequate cultivation, overgrazing of pastures, an exaggerated single-crop system, techniques not adapted to cultivation during drought, and the afore-mentioned destruction of trees and natural grasslands, continued to increase the intensity of normal wind erosion.

Chañar coppices, which form small windbreaks, in the area between Rio IV and Cañada Verde, Southern Córdoba.

Sandy cultivated soil covered with loose sand, encroached upon by "morena," a plant invader.

To this is added, as Arena aptly comments, "The regime of colonization based on a mistaken system of land tenure in which large proprietors or stock companies are obligated to produce wheat, the development of animal husbandry is prohibited or prohibitively limited, no compensation is made for soil conservation installations and individual technical advice on proper methods of cultivating the soil is lacking." He later adds, "The advance of erosion in La Pampa is the advance of desert accompanied by economic confusion and increasing social maladjustment. By the irony of fate, first the desert was conquered, then disheartened farmers, in turn, deserted it, themselves conquered in the unequal struggle with the tremendous impulse of natural forces."

As early as 1931–33, through the initiative of German-Argentine Agrarian Union S. A. and before the repeated crop failures due to prolonged droughts, a large contingent of farmers, more than 2,000 families, moved from La Pampa to El Chaco, establishing themselves in the colonies of Florida and Castelli.

It is clear that an old problem is now under discussion, but one which has assumed alarming proportions, especially in the year 1939–40, and one that threatens to develop over enormous areas in the Provinces of Buenos Aires, Córdoba, and San Luis and the Territories of La Pampa and Rio Negro. The executive branch of the national government has intervened to the extent of preparing and submitting a soil conservation bill.

On the other hand the National Ministry of Agriculture, through the Division of Soils, has undertaken an investigation of wind erosion in central-western Argentina, having already published a first preliminary reconnaissance survey on the effect of wind on the soils of the Territory of La Pampa and the adjacent

areas. In it the causes of erosion and the methods for its control are clearly set forth.

Without doubt little or nothing has been done, up to the present, in the practical application of the recommended control measures. A single humid year sufficed to erase totally from the mind of our farmers the horrible pictures that they had seen lived a short time before. Already no mention is made of further erosion. The farmer has returned again to the agricultural practices of earlier times without worrying greatly that erosion is but concealed and lying dormant like a lion in ambush, standing expectantly in wait for its prey, hoping only for the wind to change in order to make a new attack.

A fall-seeded grain or other cover crop following soybeans harvested for grain is an essential practice if yields are to be maintained and the soil conserved. In this instance, winter wheat has been planted after the soybeans were harvested.

CROP HUSBANDRY IN THIS YEAR OF WAR

(*Continued from p. 291*)

ment of crops in the strips, as pointed out in an article by Messrs. Wilbur, Fritz, and Painter, in the January 1942 issue of the Journal of the American Society of Agronomy.

Here is another interesting point in connection with strip cropping and the control of insects: A study conducted by biologists, in southwestern Ohio, to determine the effect of strip cropping on nesting birds shows that the number of nesting birds per 100 acres of meadow strips was double the number in regular meadows. It may be that the birds are anticipating anin crease in insect food due to the new field arrangement—if so, then certainly the greater number of birds will be very helpful in controlling the insects!

It is probably as well to point out, in conclusion, that there are no new good-husbandry methods that can be pulled out of the hat to meet the increased crop acreage problems. Timely efforts, looking toward the control of the enemies of crops and the conservation of moisture and plant food, are extremely important, and the farmer who obtains excellent yields will be the one who is on his toes, ready to thwart any blitzkreig from insects, weeds, or diseases, the farmer who works hard to conserve the rainfall and all of his soil for crop production.

GROWING SOYBEANS WITH MINIMUM EROSION

(*Continued form p. 296*)

on fertile land of moderate slope, the erosion loss approached the maximum allowable.

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NEIGHBORHOOD ACTION

By IVAN McKEEVER [1]

A CONSERVATION plan on every farm just as soon as possible—that was the goal set by the supervisors of the Tygarts Valley Soil Conservation District, Barbour and Upshur Counties, W. Va. Their problem was to explain the district program to the 3,500 farmers within the district area and enlist their active cooperation. The supervisors realized that their objective would require careful planning and positive action.

Only a few Soil Conservation Service men could be assigned to the district at the time—far too few to reach the farmers quickly by the old project or individual approach method. To use these men in the most effective manner, to obtain the greatest results, the supervisors decided, first, to secure the loyal support and active cooperation of all the agricultural agencies working in the district, and, second, to organize the farmers into groups for neighborhood action. The supervisors knew that success of the first phase of their problem would go a long way toward achieving their main objective, and with this in mind they invited the representatives of all the agencies in the two counties to a meeting, to discuss a plan for neighborhood organization. The response was inspiring—the county agents, Farm Security Administration county supervisors, Agricultural Conservation Program representatives, and Vocational Agriculture teachers spent approximately 2 days with the supervisors helping to divide the district into 97 neighborhoods and select an organization leader for each, with the idea that this leadership might change as the neighborhood program developed.

The plan is to use the neighborhood leaders as assistant district supervisors, to represent the district in their respective neighborhoods and their neighborhoods in the over-all district program. They will attend special meetings to obtain suggestions and to keep in touch with the program. The idea is that the entire program will work through the neighborhoods, with the local leader taking the initiative in organizing for education, group planning, and application and follow-up of conservation methods, to the end that the entire neighborhood will become active in a program for 100-percent conservation of the land resources.

Following this meeting, the supervisors wrote a letter of appointment to the 97 neighborhood leaders, inviting each of them, in this same letter of appointment, to an all-day meeting at the county seat, to meet with the supervisors and others for a general discussion of the over-all district program. This meeting was also intended to give the neighborhood leaders an opportunity to get acquainted with each other, and with supervisors and agricultural workers. The turnout to this neighborhood leaders' meeting was approximately 50 percent. Many who were unable to be present sent their regrets, either in writing or by speaking to some member of the Board of Supervisors.

The morning session of this neighborhood leaders' meeting was given over to general discussion, with many of the leaders taking an active part, and to brief talks by representatives of each of the agricultural agencies. The afternoon session consisted of a field trip to a nearby demonstration farm, to give the leaders an opportunity to go over a farm with a complete conservation program already in operation. Naturally, the field trip aroused more interest and enthusiasm, and brought out more queries, than the morning discussion. Before the meeting broke up, each leader was given an envelope containing the supplies he would need in stimulating interest in his particular neighborhood—bulletins on neighborhood organization and pasture management, cards of application for farmers who wished to cooperate with the district program, folders explaining what the Tygarts Valley district program was about, and copies of the cooperative agreement being used in the district.

At a later meeting of the Board of Supervisors, it was decided to divide the neighborhood leaders fairly equally among the supervisors. In other words, each supervisor would be responsible for aiding approximately 20 neighborhood leaders in getting better acquainted with the program and starting the work in the various communities. It was decided also that each supervisor would see that leaders who were absent from the general meeting would receive an envelope of supplies, and that each supervisor would visit, as soon as possible, all of his neighborhood leaders and discuss with them the best method for getting the program started.

It was hoped that from such contact between the supervisor and neighborhood leader a program would be developed that would call for a "get together" of all the farmers of the neighborhood—at a school house or church, at a farm home, or perhaps a day-

[1] Regional agronomy division, Northeastern Region, Soil Conservation Service Upper Darby, Pa.

time meeting on some farm for the purpose of discussing and working out a conservation plan. The kind of meeting was to be left to the best judgment of the neighborhood leader, in counsel of course with his supervisor.

It was agreed that meetings of this type would be assisted by someone capable of helping the farmers in organizing their neighborhood. All the supervisors were of the opinion, however, that wherever possible this help in organization should come from, first, the neighborhood leader and, second, his sponsoring supervisor. Should the assistance of an agricultural agency be required, then the request would be made directly to the office of the county agent, who would arrange for a representative capable of aiding under the particular circumstances. In the event of a night meeting involving a large number of people, where the objective was to create desire on the part of farmers to cooperate in the soil conservation district program, the county agent might go himself, send someone from his office, or call upon a representative of a Federal or State agency, including the Soil Conservation Service, to help with this type of meeting.

After sufficient interest has been aroused, the neighborhood leader will call a second meeting. This second meeting will be for those farmers who have indicated that they want assistance in formulating a soil and water conservation plan for their farms, and it will be attended by a farm planner from the Soil Conservation Service. The farm planner will have a land-use capability map for each farm represented, and will discuss with the farmers the meaning of the maps, their value, and how to use them in planning their program.

The land-use capability maps are introduced in this manner as a means of getting more widespread coverage and understanding on the part of the farmers and cooperators in the district. It was recognized at this meeting that land capability maps would be of great value in a program based on group action.

The ultimate success of this type of soil conservation program will depend upon a number of factors. The first 3 months' accomplishments in this West Virginia area seem to indicate that the whole-hearted cooperation of all agricultural agencies in backing a neighborhood organized district is going to give excellent results.

The first quarter of a year showed 103 cooperating farms, covering approximately 14,000 acres. All the plans were worked out with the farmer and were as complete as the farmer and farm planner knew how to make them, after they had carefully considered both economic and physical factors. The farmers accepted the entire program, along with the responsibility of doing the work, after they understood that they would have ample time to complete the job, even though they were encouraged to get some work done as soon as possible.

All strip boundaries on the cooperating farms are on the contour and are plowed in as soon as possible after the agreement is signed on all fields needing strip cropping. The first 103 farms already have over 1,700 acres of contour strip cropping boundaries plowed in. By following this method of lay-out, a relatively small amount of technician time is needed, the job is well done, and the farmers have the satisfaction of being a part of the program during its beginning stages. The supervisors feel that the more time-consuming and technical jobs will come easier if the farmers are brought into the program by doing the things they can do without delay.

Cooperation of Federal and local agencies, as well as of farmers, is being stressed in this new soil conservation district in West Virginia. The Soil Conservation Service, of course, has been "in the middle" of the program from the beginning. Farm Security Administration workers are insisting that all of their clients have a conservation program with the district. The county agents of the Extension Service are pushing the work in groups and with individuals, and the Vocational Agriculture instructors of the district are organizing their day classes and evening schools so that the teaching of soil and water conservation will receive major consideration. Vocational Agriculture departments already have come to the supervisors and asked to sponsor work, such as laying out strip cropping, building diversion ditches and planting trees, on certain farms. The work is to be done free of charge for its value in teaching the boys the best practices of soil and water conservation. It is also planned that these boys will be able to aid on their home farms in laying out and installing conservation measures. The same procedure was applied for the larger 4-H boys' groups in both of the counties of the Tygarts Valley district. At the 4-H county camps last summer, a class of instruction in soil conservation work was included for the older boys, taught by a member of the personnel of the Soil Conservation Service located in the district.

The supervisors realize that they have just started, but they feel that they have made a good beginning in organizing their district into neighborhoods for effective action toward conservation of the farm lands of the whole of this large area.

OSAGE-ORANGE PLANTINGS

By CHARLES F. McGRAW and JOE B. DAVIDSON [1]

THE Osage-orange, first widely used for hedge fences in the Corn Belt about 1850, began to disappear about 1910 when miles of hedges were uprooted. At about the same time a marked decrease of quail and other kinds of wildlife was noted, for the Osage-orange not only provides shelter where trees are scarce but furnishes food for the fox squirrel, gray squirrel, muskrat, rabbit, black-tailed deer, crow, pheasant, crossbill, and other small birds.

Of the many species of plants used for woodland and wildlife plantings, Osage-orange has been found by soil conservation technicians to be one of the most valuable. There are four ways in which it may be used on the farm:

1. As a hedge and living barrier of one to three rows around reforested areas to develop a dense, thorny border impenetrable to livestock.

2. In pastures as a border planting around wooded areas to protect them against wind and grazing.

3. As a plantation for supplying farm wood products. In a few years straight posts may be produced and an excellent return thus realized. The plantation may be located where it will offer protection for feed lots.

4. As an odd-corner planting to provide small wildlife escape coverts of 25 to 50 trees. These plantings will also grow a post crop, and help to control erosion.

The whole tree may well be utilized on most farms. Of course, the post is the most important part, but the tops and branches may also be used. The larger branches make excellent fuel wood, the smaller may be used as brush barriers in pasture to protect small gullies and galled spots from livestock. Usually these spots are "healed over" by the time the brush has decayed. These brush barriers also are valuable for cover and travel lanes for wildlife. Rapid growth of sprouts from new stumps quickly reproduces a stand and provides rapid return of good cover after the posts have been cut.

[1] The authors are junior biologist at Edgington, Ill., and associate biologist Kewanee, Ill. Upper Mississippi Region, Soil Conservation Service.

BIRDS AND CONSERVATION

SONGBIRD populations have increased 20 to 40 percent on farms in Delaware, Maryland, and New York where soil conservation measures have been practiced for 3 years. In New York, breeding birds are now twice as numerous in strip-cropped fields as in comparable fields not in strips; species as well as numbers of individual birds have increased. A recently constructed flood storage and stock pond, fenced against grazing cattle, already has demonstrated the value of protected water areas in attracting songbirds, marsh birds, and waterfowl. Since the completion of the pond, eight additional species of birds have been observed to use it and the surrounding area.

On the farms studied in the Northeast, hedgerows have the highest bird populations of any habitat. Censuses of brushy fence rows in Delaware and New York revealed populations of 30 to 50 pairs of nesting birds per acre, which is equivalent to approximately 1 pair in each 100 feet of hedgerow. These data indicate the importance to wildlife of the managed contour hedges that have become a supplementary soil defense measure on many farms in the Northeast.

A 3-year study in New York showed that in a 6-acre tract of mature mixed hardwoods, protected from grazing for about 40 years and supporting a dense undergrowth, there were about 5 pairs of breeding birds per acre. Thus it is apparent that small tracts of protected woodland may rank second only to hedge rows as breeding habitats for songbirds.—J. K. Terres and E. C. Murdoch.

WAR PRODUCTION AND THE TECHNICIAN

(*Continued from p. 294*)

food production on farms which have not yet been planned for conservation.

Appropriate conservation measures and attainment of war-time food goals go hand in hand. Consider the priority of conservation measures in their relation to food production. Evaluate the conservation practices in talks with district supervisors and the war board. The opportunity is at your door—to help plan and carry to a successful conclusion on all-out food-for-victory program. Put first things first, and your aid in establishing appropriate practices for developing, utilizing and conserving water and soil resources will make more certain the attainment of the food goals.

BOOK REVIEWS AND ABSTRACTS

by Phoebe O'Neall Faris

PASTURE RESEARCH IN SOUTH AFRICA. By the Division of Soil and Veld Conservation, Department of Agriculture and Forestry of the Union of South Africa. Pretoria, 1940.

Something is going on in South Africa that we must not overlook war or no war. The soil conservation people down at the bottom of the great Dark Continent are doing truly remarkable things with grasses, a few shrubby plants, and a strong feeling of national service and responsibility. It is not often that one finds a "report" of this scope and quality—compiled by a keenly alive group of research workers and addressed to their Chief, the Secretary for Agriculture and Forestry of a country such as the Union of South Africa. The expressed purpose of the 390-page report is twofold: First, to point out, with authority, the dangers to South Africa of "famine and national calamity" by way of "intensified drought effects, veld deterioration and attendant heavy losses of livestock, falling crop yields, soil erosion, and the impoverishment of farmers and country life generally"; and second, to give the results, good or bad, of a coordinated research program planned less than a decade ago and carried out steadily and purposefully by survey, experimentation at eight special stations in different regions, and by practical application on the lands of private cooperating farmers.

The introductory section of the book is rather a remarkable document in itself—remarkable especially for an intrepidity of statement concerning the futility of Government loans and subsidies to farmers while exploitation of soil is allowed to continue unabated. Some interesting points are brought out, too, about the status of South Africa as an exporting nation and the effect of this upon the land itself. One sentence is particularly pointed and fearless: "* * * it would be refreshing to see the ingenuity of the economist directed toward the framing of laws, tariffs, and subsidies for soil preservation." Apparently, in their determination to carry through an extensive set of studies for the preservation of the soils of their homeland, these scientists and practical farmers have encountered many a problem outside the boundaries of their laboratories, plots, and experimental fields, similar and sometimes almost identical to our own.

This book is especially interesting to those of us who read W. R. Thompson's "Moisture and Farming in South Africa," a 1936 book reviewed in the October 1937 issue of SOIL CONSERVATION. In those days the big argument in South Africa was aridity and what caused it and whether or not its increase was due to natural causes—Were farmers going to have to give up farming and take to the life of the shrouded Saharan on horseback? Now it develops that even then, and all along the way since then, the plant men of the Union, led by Dr. I. B. Pole Evans, Plant Industry Chief, were industriously pushing ahead with their grassland and veld experiments with the firm conviction that, aridity or no aridity, the urgent need was for plant cover, bountiful and protective, over the ill-used soils of their land, to hold the moisture, to feed the livestock and to be turned back to the land for continuous building up and maintenance of fertility.

The tremendous scope of the pasture research that has been carried on throughout the Union during the past decade certainly should be emphasized for the benefit of other countries including the United States of America. Beginning in 1934, special stations were established—eight in number—in areas representing different physical problems so that the valuable findings of the grass breeding and seed production experiments of the two older Pretoria stations could be extended quickly and in an over-all program. Surveys were then made, and experimentation started, in the sourveld, the Transvaal bushveld, the middleveld of the Transvaal and northern Orange Free State, and the tall grass veld and the mountain sourveld of Natal. The work then went forward rapidly to determine the best grasses, shrub vegetation, and legumes for reclamation of the many veld variations, and keys to grazing management plans to fit requirements of the land and the livestock industry.

Pasture specialists in almost all parts of the United States will be interested in the results of the South African experiments because, although we usually think of the southernmost country of Africa as arid and semiarid, there are, as revealed by this report, many relatively large zones with local climatic conditions tending to the humid. As for our Great Plains, and our arid Southwest, many of the South African findings will be directly applicable—and no doubt gratefully received by soil conservation and pasture management workers in those regions.

A nine-page list of the pasture plants that have been tested at the Prinshof Grass Breeding Station is given early in the book, with brief reference to results. This list contains many species native to the Union, many from Australia, the U. S. S. R., England, and the United States. Relatively few of the imported plants were proved of value for South Africa's veld and pasture needs, so that to a large extent the problem evolved into one of improving indigenous species, establishing permanent year-round pastures, and planning maintenance management to build up and keep in condition those grazing lands already in existence. Seed production as an important part of the over-all plan has received considerable attention at Prinshof, and the ecological studies of grasses indigenous to South Africa point to a narrowing down of the whole tremendous scheme to save the soils and the livestock industries of the Union.

Very detailed reports are given, by chapters, of the work at the special stations; each is a volume in itself. The areas are carefully described as to soils, plant communities, cultivable land, farming and grazing methods, and weather and rainfall conditions. The experiments conducted depend of course upon the area in which the station is located, but all of them have to do with pasture and veld problems such as sward composition and palatability, live-weight changes in stock, controlled grazing for veld maintenance, herbage yield, seasonal variations in pasture values, bush density and composition, reclamation of scrub pasture and thornveld, botanical analyses to determine edible plants for nursery production, and grazing management by fencing on private farms.

In the highveld area, winter forage seems to be the paramount need, and because of this the experiments with grasses for hay and silage are stressed; while in another area, at the Estcourt station, pastures under irrigation are being tried out to determine the value of this method for milk production on a large scale.

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For REFERENCE

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[1] Prepared solely for use by the Soil Conservation Service and official cooperators. Not available for general distribution.

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DETROIT

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READY FOR ENEMY PLANES OR FIFTH COLUMN INSECTS

See page 289